DOCUMENT RESUME

ED 323 116 SE 051 576

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TITLE Mathematics/Computer Integrated Curriculum, Grade 4.
SPONS AGENCY Texas Higher Education Coordinating Board, Austin.
PUB DATE Aug 90
NOTE 23p.; For related documents, see SE 051 573-578.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Computer Uses in Education; *Course Content; Curriculum Design; Curriculum Development; Curriculum Guides; Educational Games; *Elementary School Mathematics; Geometry; *Grade 4; Instructional Materials; Intermediate Grades; *Learning Activities; Mathematics Curriculum; *Mathematics Education; Mathematics Skills; Puzzles; Teaching Guides
IDENTIFIERS *LOGO Programing Language

ABSTRACT

This manual designed for grade 4 is part of a series for a program to integrate the teaching and learning of mathematical and computer concepts and skills in the elementary school. This manual contains 16 lessons. Each lesson includes information on the topic, suggested grade level, mathematics concepts and skills, objective, prerequisite skills needed, and activities. Topics contained in the lessons include: (1) problem solving; (2) geometry; (3) numbers; (4) measurement; (5) number concepts; (6) LOGO; and (7) puzzles. Software programs used for the activities are specified for each lesson. (KR)

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ED323116

Mathematics / Computer Integrated Curriculum Grade 4

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This curriculum material was produced under a grant from the Texas Higher Education Coordinating Board and the U.S. Education Department under the auspices of the Eisenhower Mathematics and Science Grants Program, Title II.

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How can Integrated Computer Curriculum be used in Elementary School (and can I do it?)

by: Michelle Murray-Hurst

Upon entering the last decade of the 20th century-- we are continuing to move forward into the age of technology. Computers of some types have been around since the 1940's and have been used in the school setting since the 1960's. But, are we using the computers effectively and if so, are we integrating them into the regular curriculum? Educators seem to be aware of the need for computer instruction in the middle and upper grades but often it is thought that computers in the lower elementary grades are only for drill, practice, and games. WRONG!! These young children are very interested in computers and are capable of solving some complex problems. Many times students find that grasping concepts is easier using the computer rather than the traditional methods of instruction. Because children are unique and have different learning styles it seems important to provide as many learning opportunities as possible. The computer allows increased methods by providing visual, tactile, and some times auditory responses.

But, let's face the problem, computers are an important part of instruction at all grade levels but the most important fact is to use them on a primary level. Elementary education is the perfect place to begin a strong base of computers because of these students' hunger for knowledge. Mathematics conveniently lends itself to the integration of the computer. It can be done and is being done today. Integration may take a little extra time and effort but the rewards could be bountiful. The mathematics

curriculum is relatively simple and all of the objectives may be taught or enriched by using the computer.

Now is the time that educators realize that computers are our friends and want to make our lives easier. It is our responsibility to allow our children to grow up with computer knowledge and not be afraid to experience new technological advances.

Integration of computers into the curriculum is here today and is something that can be easily expanded through ingenuity and creativity. Many curriculum documents to assist teachers in making this transition have been developed. This document was designed for kindergarten through sixth grade and the lessons can be presented by teachers with very little computer experience. So we recognize that integration can be easily done.

Computer Lesson # 4-1

Topic: Geometry

Suggested Grade Level: 4

Mathematical Essential Element: Investigate the properties of a two dimensional figure. Work with similarity

Descriptor: 5 A and B

Objective: TLW use and define basic commands in logo. Identify figure and make larger ones.

Content Description: 1. Basic logo commands.

2. Identify a pentagon

3. Draw similar pentagon.

Prerequisite Student Skills: Name or identify a figure with 5 sides. (p

Know to press return key after each command

Activities: Type in this procedure.

1. Home

CS

FD 50

RT 72

FD 50

RT 72

FD 50

RT 72

FD 50

RT 72

FD 50

RT 72

2. What do "FD" tell the turtle to do ?

3. What does "RT" tell the turtle to do?
4. What figure did you make?
5. What would the turtle do if you used "LT" ? Try it.
6. Make the same figure larger.

Instructional Resource: Terrapin Logo

Computer Lesson #4-2

Topic: Logo Commands

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW use given commands to draw a picture.

Content Description:

Prerequisite Student Skills: Know that you need to tell turtle how far to move in each direction.

Activities: 1. Use any or all of these commands to draw a picture.

FD RT LT Home PU (pen up) PD (pen down) BK

2.Write the steps you used on a sheet of paper.

3.Have a friend follow your steps to draw the picture.

Instructional Resource: Terrapin Logo

Computer Lesson #4-3

Topic: CONGRUENT FIGURES

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW use two processes to draw a square and see if they are congruent.

Content Description: Draw a square using single commands and draw a square using repeat commands.

Prerequisite Student Skills: know right and basic Terrapin commands

Activities:

1. Draw a square FD 80 RT 90 FD 80 RT 90 FD 80 RT 90 FD 80
2. Draw a square REPEAT 4[FD 80 RT 90]
3. Change RT 90 in activity 1 to LT 90 and see if it is congruent to activity 2.

Instructional Resource: Terrapin LOGO

Computer Lesson #4-4

Topic: TWO-DIMENSIONAL FIGURES

Suggested Grade Level: 4

Mathematical Essential Element: Identify the vertex and name the angle of a two dimensional figure

Descriptor:

Objective: TLW draw and label a square, rectangle and identify the vertices and angles

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Content Description: Property and relation of geometric figures

Prerequisite Student Skills: know what a square, rectangle and vertex and angles are. know symble for angles

Activities:

1. Draw a rectangle: FD 70 RT 90 FD 50 RT 90 FD 70 RT 90 FD 50
2. Draw a square: REPEAT 4[FD 80 RT 90]
3. Count vertices and angles in activities 1and 2

Instructional Resource: TERRAPIN LOGO

Computer Lesson #4-5

Topic: CONGRUENT FIGURES

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW use two processes to draw a square and see if they are congruent.

Content Description: Draw a square using single commands and draw a square using repeat commands.

Prerequisite Student Skills: know right and basic Terrapin commands

Activities:

1. Draw a square FD 80 RT 90 FD 80 RT 90 FD 80 RT 90 FD 80
2. Draw a square REPEAT 4[FD 80 RT 90]
3. Change RT 90 in activity 1 to LT 90 and see if it is congruent to activity 2

Instructional Resource: Terrapin LOGO

Computer Lesson # 4-6

Topic: ORDER OF OPERATIONS

Suggested Grade Level: 4

Mathematical Essential Element: use parentheses to determine the order of operation

Descriptor: 73.4342

Objective: TLW use parentheses to determine the order of operations

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Content Description:

Prerequisite Student Skills: Know why parentheses are used and how to do basic operations(add, sub., mult.)

Activities:

1. Type CLEARTEXT
2. Type PRINT 24-8*3
3. Compare to PRINT 24-(8*3)
4. Enter three more numbers with at least two operations(+,-,*) do not use parentheses
5. Enter the same three numbers in activity 4, use parentheses

   If the answer is the same both ways, the parentheses may have been unnecessary.

Instructional Resource: The Computing Teacher - March 1984, TERRAPIN LOGO

Computer Lesson #4-7

Topic: LINES OF SYMMETRY

Suggested Grade Level: 4

Mathematical Essential Element: find lines of symmetry by tracing or by folding a drawing

Descriptor: 74.4643

Objective: TLW find lines of symmetry by plotting a letter and a line

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Content Description: Coordiate geometry lines of symmetry

Prerequisite Student Skills: know what a line of symmetry is . Plotting commands and how to prepare for plotting

Activities:

1. 10 GR
   20 COLOR=3
   30 HLIN 9,15 AT 19
   40 HLIN 9,15 AT 25
   50 VLIN 19,25 AT 9
   60 VLIN 19,25 AT 15
   RUN
   70 VLIN 19,25 AT 12
   RUN
   Is this a line of symmetry?

2. 70 HLIN 9,15 AT 22
   RUN
   Is this a line of symmetry?

3. 10 GR
   20 COLOR=3
   30 HLIN 12,15 AT 7
   40 VLIN 5,7 AT 12
   50 HLIN 12,15 AT 5
   60 VLIN 7,10 AT 15
   70 HLIN 12,15 AT 10
   RUN
   80 VLIN 5,10 AT 13
   RUN
   Is this a line of symmetry?

Instructional Resource: Basic program - low resolution graphics

Computer Lesson #4.8

Topic: SIMILAR FIGURES

Suggested Grade Level: 4

Mathematical Essential Element: Identify two figures that appear to be similar

Descriptor: 74.4643

Objective: TLW identify two figures that appear to be similar

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Content Description:

Prerequisite Student Skills: know what similar means and plot using high resolution graphic commands. Know how to number for plotting

Activities:

plot: 10 HGR

```
20 HCOLOR =3
30 HPLOT 80,40 TO 100,40
40 HPLOT 80,40 TO 80,55
50 HPLOT 80,55 TO 100,55
60 HPLOT 100,55 TO 100,75
70 HPLOT 80,75 TO 100,75
80 HPLOT 145,40 TO 170,40
90 HPLOT 145,40 TO 145,75
100 HPLOT 145,75 TO 170,75
110 HPLOT 170,75 TO 170,55
120 HPLOT 170,55 TO 155,60
130 HPLOT 40,50 TO 55,50
140 HPLOT 40,50 TO 40,60
150 HPLOT 40,60 TO 55,60
160 HPLOT 55,60 TO 55,70
```

```
170 HPLOT 55,70 TO 40,70
RUN
```

Which two are similar?

Instructional Resource: Basic Program - High resolution graphics

Computer Lesson #4-9

Topic: Introduction to Gertrude's Puzzle

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW become familiar with keys and doors used in Gertrude's Puzzle

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Content Description:

Prerequisite Student Skills:

Activities: 1. Write the name of the correct key.

a.) picks up and drops objects_____

b.) moves the cursor right _____

c.) moves the cursor left _____

d.) moves the cursor up _____

e) moves the cursor down _____

2.) To see a HELP screen for directions, press _____

3.) To leave the program, press _____

4.) To turn the sound on and off, press _____ and _____

Instructional Resource: Gertrude's Puzzle

Computer Lesson #4-10

Topic: Gertrude's Puzzles

Suggested Grade Level: 4

Mathematical Essential Element: 7c

Descriptor:

Objective: TLW list the possible outcomes in a given directions.

Content Description:

Prerequisite Student Skills: Know the basic keys and how to follow given directions

Activities: 1.) Load "Gertrude's Puzzle"

2.) Go through introduction, following given directions

3.) When you get to Gertrude's Room select " Box Puzzles", work through program

4.) Try to find another way to solve this puzzle

Instructional Resource : Gertrude's Puzzle

Computer Lesson #4-11

Topic: Problem Solving

Suggested Grade Level: 4

Mathematical Essential Element: 1.7

Descriptor: Strategy for drawing a picture and graphing

Objective: TLW draw a picture, and graph the picture on the computer.

Content Description:

Prerequisite Student Skills: How to plot and identify x,y co-ordinates

Activities: 1. Load " Bumble Game"

2. Select # 6, Bumble Dots____
3. Select instructions
4. Select # 2, make your own
5. Use activity "Making a Bumble Picture" p.27
6. Optional p.28 "What is Hiding?" May be used.

Instructional Resource: Bumble Games

Computer Lesson #4-12

Topic: Problem Solving

Suggested Grade Level: 4

Mathematical Essential Element: 1.2

Descriptor: Analyzing problems and observe patterns

Objective: TLW analyze problems, observe patterns, and prioritize relationships in Tic Tac Toc

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Content Description: This activity requires two players.

Prerequisite Student Skills: know how to identify xand y co-ordinates and how to play traditional Tic Tac Toc

Activities: 1. Load Bumble Games

2. Select #5 Tic Tac Toc
3. Go thur instructions
4. Follow instructions with program

Instructional Resource: Bumble Games

Computer Lesson #4-13

Topic: Problem Solving

Suggested Grade Level: 4

Mathematical Essential Element: 1.1

Descriptor: Developing and organized approach to solving application and non routine problems involving operations and computations.

Objective: TLW use whole numbers given x values, determine y values using computations , plot the number pair on the computer.

Content Description:

Prerequisite Student Skills: Know how to follow written rules and plot number pairs on a grid.

Activities: 1. Activity sheet p. 24 "Discoveries III"

2. Complete each table of numbers using given rules.
3. Plot number pairs and connect the points for each table of numbers.
4. Plot points on the Activity sheet
5. Identify the shape.
6. Load "Bumble Games"
7. Select #6 "Bumble Dots"
8. Select instructions (if needed)
9. Select #2 "Make your own"
10. Plot points from your activity sheet.

Instructional Resource: Bumble Games

Computer Lesson #4-14

Topic: Line Segment

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW identify and measure line segments

Content Description:

Prerequisite Student Skills:

Activities: 1. Press N

2. Select #5 for quadrilateral
3. Select #2 parallelogram
4. Select #4 for square
5. Select M for measure
6. Identify length of segments
7. Measure lengths of line segments by selecting #1 for length
8. Enter line segment points to be measured
9. Return twice after entering each line segment . Length of each segment is given.
10. Press ESC to main menu

Instructional Resource: Geometric Presupposor

Computer Lesson #4-15

Topic: GEOMETRY (quadrilateral)

Suggested Grade Level: 4

Mathematical Essential Element: 6.4

Descriptor:

Objective:

Content Description: Compare and contrast angles relationship to right angles

Prerequisite Student Skills: Knowledge of right angles; addition skills students will learn that in a quadrilateral shape with right angles. Two angles will always equal 180 and that all four angles equal 360

Activities: Program load Geometric preSupposer,

press N for new shape,
press 5 for quadrilateral,
press 3 for trapezoid,
press 3 for right angle,
press M for measure,
press 4 for angle,

Measure all 4 angles: the right angles should equal 180,
the opposite angles should equal 180

Instructional Resource: Geometric preSupposer - Apple computer

Computer Lesson #4-16

Topic: Area of Rectangle and Square

Suggested Grade Level: 4

Mathematical Essential Element:

Descriptor:

Objective: TLW find the area of a rectangle and a square

Content Description:

Prerequisite Student Skills:

Activities: 1. Press N for new

2. Select #5 quadrilateral
3. Select #2 for parallel
4. Select #4 for square
5. Select M for measure
6. Select #3 for area
7. Enter points on square
8. return
9. return, area of square is given
10. ESC (twice) press N for new
11. Select #5 for quadrilateral
12. Select #2 for parallelogram
13. Select #2 for rectangle
14. Select #M for measure
15. Select #3 for area
16. Enter point of rectangle
17. Return twice -area of rectangle is given